We claim:

1. A method of controlling the directional movement of a self-propelled robotic pool cleaner comprising the steps of:

a. providing a pool cleaner having a first and second pair of dual brushes co-axially mounted at opposite ends of the pool cleaner for rotation on axles that are transverse to the direction of movement, the first pair of brushes being mounted on one side and the second pair of brushes mounted on the opposite side of the cleaner, the pool cleaner being propelled by the rotation of the brushes, said pool cleaner having at least one drive motor operatively connected to the first pair of brushes for synchronous drive;

b. activating the at least one drive motor to propel the pool cleaner in a first direction along a generally straight path by the synchronous rotation of the first and second pair of brushes;

c. stopping and reversing the drive motor to rotate the first pair of brushes at a greater angular rotational velocity than the second pair of brushes thereby pivoting the pool cleaner through a predetermined angular change in direction; and

d. resuming the synchronous rotation of the second pair of dual brushes with the first pair of brushes, whereby the pool cleaner moves in a second direction along a generally straight path that is angularly displaced from the first direction.

2. The method of claim 1, wherein the pool cleaner is provided with a rotational delay clutch co-axially positioned between each of the first and second pair of dual brushes at either end of the pool cleaner,

and the method of step (d) includes rotating the first pair of driven brushes through a predetermined number of degrees of angular rotation while the second pair of free brushes remain stationary; and

engaging the second pair of brushes via the clutch to initiate synchronous rotation of the second pair with first pair of brushes.

3. The method of claim 2, wherein the rotational delay clutch includes a fixed clutch plate attached to each of the opposing faces of the first and second pair of brushes, and the method includes rotating the first fixed plate until it engages the opposing plate on the second pair of brushes to initiate the synchronous rotation of the second pair of brushes with the first pair of brushes.

4. The method of claim 2, wherein the rotational delay clutch includes a fixed clutch plate attached to opposing faces of each of the first and second pair of brushes and at least one intermediate free plate that is mounted for rotation on the axle between the fixed clutch plates, and the method includes rotating the first fixed plate to engage the at least one intermediate free plate and continuing said rotation to engage the opposing fixed plate on the free second brush to initiate the synchronous rotation of the second pair of brushes with the first pair of brushes.

5. The method of claim 2, wherein the rotational delay clutch includes an elongated flexible member extending between opposing end members attached to each of the opposing faces of the first and second brushes on each axle and in winding contact with the axle, and the method includes rotating the first pair of brushes to first unwind the flexible member and then to rewind the flexible member in the opposite direction until synchronous rotation of the second pair of free brushes is initiated.

6. The method of claim 2, wherein the rotational delay clutch includes an expandable member rotatably positioned between the opposing ends of each of the first and second brushes, and the method includes applying a pressurized fluid to extend the expandable member to frictionally engage the second brush while the first brush is rotating and thereby initiate synchronous rotation of the second pair of brushes with the first pair of brushes.

7. The method of claim 2, wherein the rotational delay clutch includes a two-part orbital gear assembly, a first rotating member of which gear is attached to each of the first brushes and a second member of which is attached to each of the second brushes, whereby the first and second orbital gear members are temporarily disengaged when the direction for rotation of the first brush is reversed and are engaged after a predetermined rotation of the first brushes.

8. The method of claim 2, wherein the rotational delay clutch includes an electro-mechanical clutch engagement assembly and associated means for actuating

the engagement of the first and second brushes at predetermined intervals following a reversal of direction of rotation of the first pair of brushes.

9. The method of claim 1, wherein the pool cleaner is provided with a first drive motor operatively connected to the first pair of brushes, a second drive motor operatively connected to the second pair of brushes, a controller for controlling the operational speed and direction of the respective motors in response to a processor signal, and the method further comprises the steps of:

e. actuating the first and second drive motors simultaneously to propel the pool cleaner in the first direction;

f. stopping the first and second drive motors and actuating the first motor for rotation in the opposite direction at a rotational velocity that is greater than that of the second motor; and

g. after a predetermined period of time, actuating the second drive motor for synchronous rotation with the first drive motor.

10. The method of claim 9, wherein the second motor remains stopped during step (f).

11. The method of claim 1 which further comprises:

operating the pool cleaner in accordance with a program in which it is propelled in the first direction for a first predetermined period of time and in the angularly displaced second direction for a second predetermined period of time that is less than the first period of time, and

repeating this pattern of programmed movement.

12. The method of claim 11, wherein the pool cleaner traverses about one-half of the distance between the side walls of the pool during the second period of time.

13. The method of claim 11, wherein the pattern of programmed movement is repeated for a predetermined number of cycles constituting an original cycle, after which the pool cleaner is propelled in the first direction for an extended period of time that is about twice the first period of time, after which the pool cleaner is stopped and the original cycle is then repeated.

14. The method of claim 12, wherein the pool cleaner changes from a clockwise to a counter-clockwise pattern of movement during the cycle of time in which it is cleaning the pool bottom and side walls.

15. The method of claim 1 in which the at least one drive motor is powered by a battery.

16. The method of claim 1, in which the pool cleaner further includes a pump discharge stream having a force vector that is normal to the surface on which the pool cleaner is positioned and the pump is operated continuously during the cleaning cycle.

17. The method of claim 1 in which the pool cleaner further includes a signal-generating orientation sensor that is activated when the pool cleaner moves from a generally horizontal orientation to an angle of about 70° or more at either end, and the method includes:

propelling the pool cleaner for a predetermined period of time in response to a signal indicating that the pool cleaner is ascending a side wall,

terminating the pool cleaner's movement after the predetermined period of time, and

reversing the direction of movement to cause the pool cleaner to descend the wall along an angularly displaced path from that in which the pool cleaner ascended the wall.

18. A self-propelled robotic pool cleaner comprising:

a. a pool cleaner housing having a first and second pair of dual brushes co-axially mounted at opposite ends of the housing for rotation on axles that are transverse to the direction of movement, the first pair of brushes being mounted on one side and the second pair of brushes

mounted on the opposite side of the cleaner, the pool cleaner being propelled by the rotation of the brushes;

b. at least one reversible drive motor operatively connected for synchronously driving the first pair of brushes ;

c. a controller for controlling the direction of rotation of the at least one drive motor and thereby the directional movement of the pool cleaner; and

d. a rotational delay clutch assembly that is co-axially positioned between each pair of the first and second brushes, whereby a reversal in the direction of rotation of the first pair of driven brushes temporarily disengages the clutch from the second pair of brushes thereby pivoting the pool cleaner through a predetermined angular change in direction before initiating the synchronous rotation of the second pair of brushes, whereby the pool cleaner moves in a direction along a generally straight path that is angularly displaced from the direction prior to the reversal.

19. The pool cleaner of claim 18, wherein the rotational delay clutch includes a clutch plate attached to each of the first and second pair of dual brushes at either end of the pool cleaner, and at least one clutch engagement member in each clutch assembly, whereby the clutch plate attached to the first pair of driven brushes is rotatable through a predetermined number of degrees of angular rotation while the

second pair of free brushes remain stationary before engagement of the second clutch plate

to initiate synchronous rotation of the second pair and first pair of brushes.

20. The pool cleaner of claim 18, wherein the rotational delay clutch assembly includes a fixed clutch plate attached to opposing faces of the first and second pair of brushes and at least one intermediate free plate that is mounted for rotation on the axle between the fixed clutch plates, whereby the clutch plate attached to the first pair of driven brushes is rotatable to engage the at least one intermediate free plate and continues said rotation to engage the opposing plate on the second pair of brushes to initiate the synchronous rotation of the second pair of brushes with the first pair of brushes.

21. The pool cleaner of claim 18, wherein the rotational delay clutch assembly includes an elongated flexible member extending between opposing end members attached to the opposing faces of the brushes on each axle and in winding contact with the axle, whereby reversal of the direction of rotation of the first pair of brushes unwinds the flexible member from the axle then rewinds the flexible member on the axle in the opposite direction until synchronous rotation of the second pair of brushes is initiated.

22. The pool cleaner of claim 18, wherein the rotational delay clutch includes an expandable member rotatably positioned between the opposing ends of

each of the first and second brushes, and in communication with a controlled source of a pressurizing fluid, whereby controlled passage of the pressurizing fluid into the expandable member extends the expandable member to frictionally engage the second brush while the first brush is rotating to thereby initiate synchronous rotation of the second pair of brushes with the first pair of brushes.

23. The pool cleaner of claim 18, wherein the rotational delay clutch assembly includes a two-part orbital gear assembly, a first rotating member of which gear assembly is attached to each of the first brushes and a second member of which is attached to each of the second brushes, whereby the first and second orbital gear members are temporarily disengaged when the direction of rotation of the first brush is reversed.

24. The method of claim 18, wherein the rotational delay clutch assembly comprises an electro-mechanical clutch engagement assembly and associated means for actuating the engagement and disengagement of the first and second brushes at predetermined intervals in response to signals from a programmed controller.